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Economic Feasibility Study of Onshore Exploration Oil Field Development using Gross Split Contract

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Abstract. The condition of the oil and gas world economy is not good and the cost recovery is too large and the results obtained are not comparable to those obtained by the contractor. Thus, the change in the new contract system with the addition of split rules for contractors considers in managing the oil and gas fields. To restore the situation and restore the spirit of the contractor to continue investing in Indonesia, the Indonesian government provides contractors with incentives and other alternatives to change the existing PSC Contract with the Gross Split PSC based on the Minister of Energy and Mineral Resources Regulation No. 52 of 2017. Field X is one of the onshore Exploration fields in the South Sumatra Basin. The field is a commercial field that has potential oil reserves to be managed. To conduct field X development, it is necessary to conduct an economic study of field X development using a Gross Split contract to determine the feasibility level. Based on calculations using the Gross Split Contract field development X has a contractor NPV value of \$ M 192,63, Government NPV = 415,235 and Contractor IRR = 41.04%, Government Take = 72.3% and Contractor Take = 27.7%. Based on this, the Government and Contractors will benefit from using the Gross Split PSC Contract because it is economical to develop.

Keyword: oil field, gross split, petroleum economic, exploration

1. Introduction

Nowadays Indonesia is undergoing various revisions and improvements to regulations, along with the activities of the oil and gas industry, such a situation will certainly have an impact on the investment climate in the upstream oil and gas sector [1]. Oil and gas investment is made based on profit considerations, so the quantities that affect it, namely reserves that produce production, costs, prices, and taxes need to be known [2]. International oil companies and the Government of Indonesia have different points of view regarding the Production Sharing Contract (PSC) [3].

Looking at the historical development of the Indonesian PSC generation from the first generation of 1966 to the current generation, it is always undergoing a policy change that has occurred along with the emergence of new regulations to attract investors to invest in Indonesia. Oil and gas policy is a government attitude towards the form of management of oil and gas resources. Thus the production sharing cost recovery contract formulating the policy depends on the situation in the development of the oil and gas industry [4].

In January 2017, the Indonesian government issued regulation of the Minister of Energy and Mineral Resources No. 8 year 2017 concerning the Gross Split PSC but in August 2017 a regulation was changed from the previous by the Minister of Energy and Mineral Resources to Number 52 year 2017 from some changes to the provisions. The Gross Split Contract is a production sharing contract based on the principle



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of gross production sharing without a cost recovery mechanism so that all costs incurred for block operations are fully borne by the contractor [5]. Unlike previous production sharing contracts that use fixed net split after tax for contractors and the government, in this new fiscal period, contractor splits are determined using a basic split that is adjusted based on progressive variables and components [6].

This research was conducted to examine the economic feasibility of developing onshore oil exploration fields in the southern Sumatra basin using a gross split contract.

2. Methods

2.1. Data collection

Collection of research data from the field. Field review where the research was conducted. From the data obtained can be known reservoir characteristics, production profile, and costs required for the Onshore Exploration X Field development project. Data obtained for reserves calculation onshore exploration X field is from Geological data. From the field data, it is assumed that the shape of the reservoir is Ellipse then calculated for oil reserves using the volumetric method. Furthermore, the forecasting of the X field production profile is assumed up to 30 years.

2.2. The economic development model of X field based on gross split contracts

In January 2017, the Government of Indonesia issued Minister of Energy and Mineral Resources (ESDM) Regulation No. 08 of 2017 concerning the Gross Split PSC. In accordance with regulations, the Gross Split PSC is a production sharing contract based on the principle of sharing production without a cost recovery mechanism so that all costs incurred for block operations are fully borne by the contractor [7]. Then in August, the Government of Indonesia revised from the previous law so that it became law No. 52 of 2017 different are some of the split values or from each of the respective components.

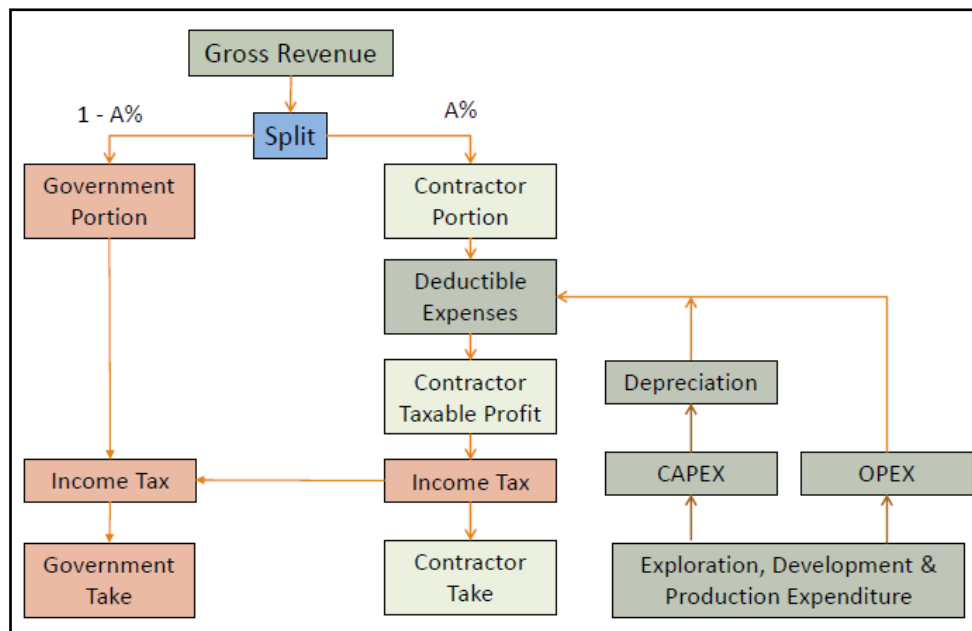


Figure 1. PSC management with gross split [8]

The gross split PSC does not have a cost recovery mechanism, therefore PSC contractor income comes solely from its gross production sources (and also has to pay income tax to the government in connection with this income). Government revenue will consist of the government's gross share of production, bonuses, PSC contractors' income taxes and indirect taxes paid by PSC Contractors. Initial base split each PSC gross split will have an initial base split percentage for each field developed within

the contract area, which is then adjusted to the specific field factors listed in the Regulations. According to Law No. 52 of 2017, The basic division for PSC Contractors is 43% for oil and 48% for gas. The factors that change the initial base split is because this new scheme leads to PSC contractors who bear greater risk. The regulation provides certain incentives that offer increased production based on regulations which are described as variable and progressive factors. Indicators of project feasibility can be used quantitatively as a guide or evaluation tool in making decisions regarding project feasibility. The project feasibility indicators are: NPV and IRR. Then, sensitivity analysis is a way to see the effect of changing parameters on economic indicators. The parameters used for the sensitivity analysis include: production, price, investment and operating costs.

3. Result and Discussion

3.1 Field production projection

X field is an onshore exploration field that is projected to produce oil starting in the 11th year with a total reserve of 170 MMSTB. Table 1 is a table of forecasting results of X field production profiles for 30 years using the decline curve analysis method. In the 16th year onwards production is expected to decline due to decreased reservoir pressure.

Table 1. Forecasting result of X field production profiles

Year	Oil Production (Bbl)	Year	Oil Production (Bbl)	Year	Oil Production (Bbl)
0 – 10	-	17	4.238.548	24	1.546.850
11	1.776.057	18	3.670.107	25	1.339.399
12	2.843.525	19	3.177.901	26	1.159.769
13	4.552.575	20	2.751.705	27	1.004.230
14	5.821.041	21	2.382.668	28	869.550
15	5.623.846	22	2.063.123	29	752.933
16	4.895.032	23	1.786.433	30	651.955

3.2 Investment value planning

Planning for funding needs in X field until the contract period is completed 30 years as shown in Table 2.

Table 2. Investment planning

Year	Investment Cost MUS\$			OPEX US\$/Bbl
	Capital	Non Capital	Total	
0	-	-	-	9
1	-	1.94	1.94	9
2	-	8.01	8.01	9
3	-	208.01	208.01	9
4	-	572.03	572.03	9
5	393.71	2627.96	3021.67	9
6	787.41	12932.13	13719.54	9
7	2850.59	17854.15	20704.74	9
8	2618.39	16287.7	18906.09	9
9	2508.06	9437.7	11945.76	9
10	393.71	1901.19	2294.9	9
11 to 30	-	-	-	9

The price of oil used is the average price from January 2018 to October 2019, which is \$ 60 / bbl, while the Operating Cost (Opec) used in the calculation will be \$ 8 / bbl, an escalation factor of 2% per year.

3.3 The determination of revenue sharing between the government and contractor

The split between the contractor and the government for the gross split contract scheme has the addition of a split by the provisions of the applicable parameters, namely progressive split, and variable split. At the base split contractor, the share for oil is 57% for the government and 43% for the contractor. The magnitude of progressive split and variables split for the development of X field can be seen in Table 3.

Table 3 Improvement split field “X”

Component	Parameter	Split Correction
Variabel Split		
Field Status	POD	5%
Field Location	Onshore	0%
Reservoir Depth	<2500m	0%
Availability of Supporting Infrastructure	New Frontier	4%
Reservoir Type	Conventional	0%
CO ₂ Content (%)	-	0%
H ₂ S Content (%)	-	0%
Oil Specific Gravity	>25	0%
Component Level in the Country	30-50	2%
Production Stages	Primary	0%
Progressive Split		
Oil Price	65	5%
Cumulative Total Production	<30	10%
Contractor Split	Base split+Variabel+progressive	69%

3.4 Economic review using gross split contract

3.4.1 Net cash flow. The net cash flow development amount of X field as shown in Figure 2.

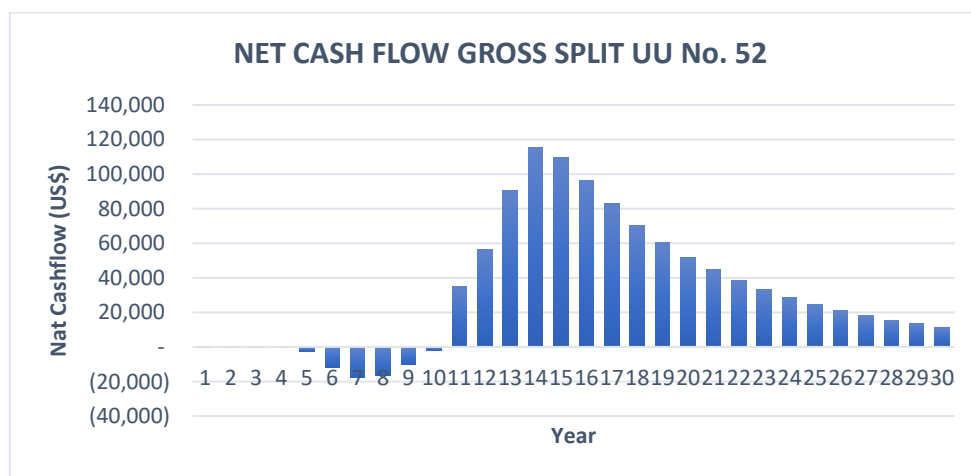


Figure 2. Net cash flow development of X field

Based on Figure 2 it can be seen that the contractor's net cash flow has a negative value from the first ten years because the x field has not produced yet, but after producing the cash flow chart has a positive value from year 11 to year 30.

3.4.2 Oil production sharing between the government and contractor. Based on the cash flow using the gross split contract system, the distribution of petroleum revenue sharing for the contractor is 27.7% and the government gets the oil sharing amounted to 72.3%. Oil production sharing chart between the government and the contractor as shown in Figure 3.

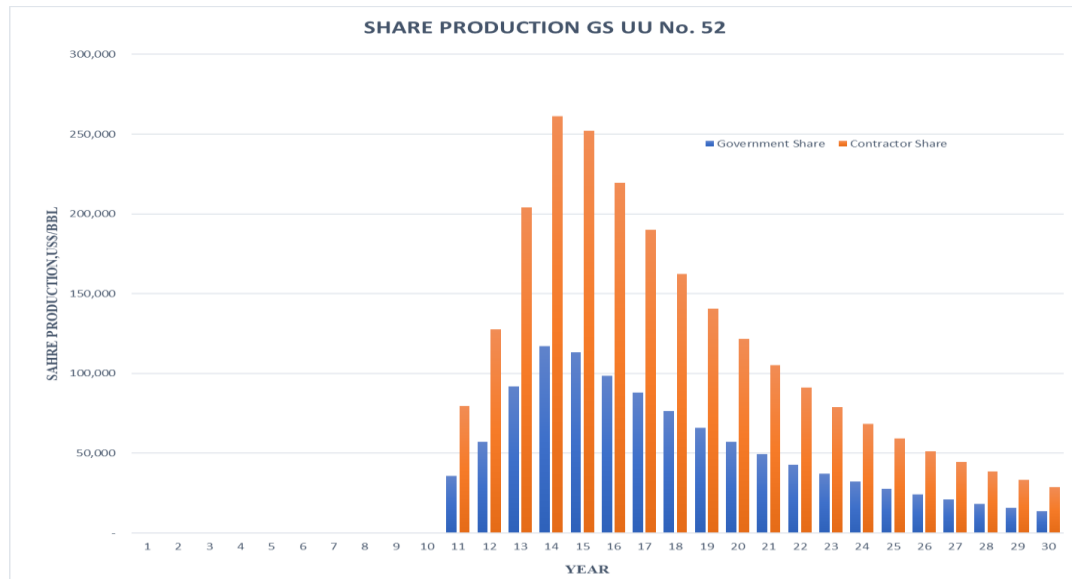


Figure 3. Oil production revenue sharing between the government and contractors

3.4.3 Calculation of economic feasibility indicators. To find out the economic value and project feasibility development of X field using the gross split contract sharing system is to calculate profit indicators in the form of Net Present Value (NPV) and Internal Rate of Return (IRR). The results of profit indicators calculation for development of oil field X using the gross split contract revenue sharing system are Contractor NPV 15% = US\$ M 192,63; Government NPV 15% = US\$ M 415,235 and Contractor IRR = 41.04%. The results of profit indicators on the project above indicate that the NPV is Positive, an IRR greater than the desired MARR ($i = 15\%$)

3.5 Sensitivity analysis

Sensitivity to NPV and IRR is economic indicators in field X using Gross Split contracts as shown in Figure 4. Sensitivity for some field conditions with the Gross split contract model is clear that production provides the largest graph slope, then the total price, investment and production costs.

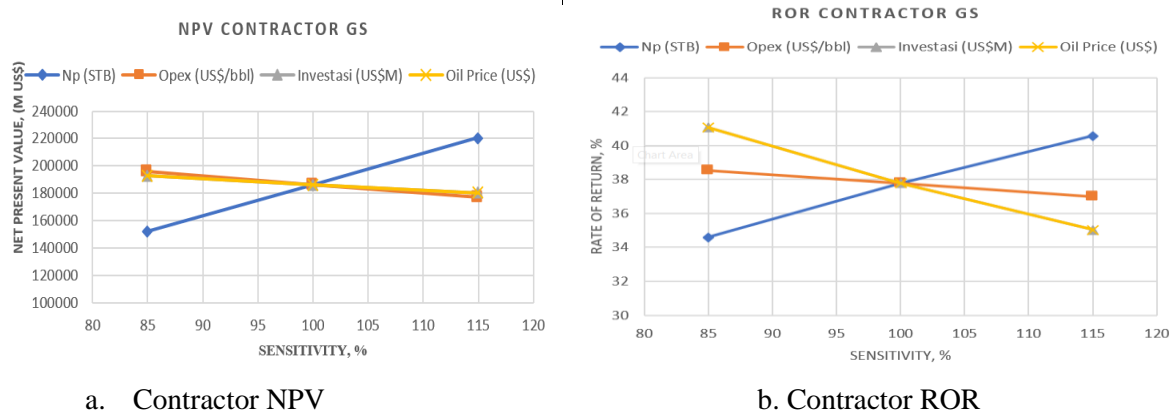


Figure 4. Sensitivity analysis

4. Conclusion

Based on the calculation results it was found that the development of onshore exploration X oil fields using Gross Split contracts is economically valuable and feasible for development. The Gross Split contract provides better and more attractive results to the contractor by providing additional intensive splits if the contractor does so according to specified requirements. Also, if in a field that is to be managed does not reach a certain economy, then based on Article 7 paragraph 1 the gross split ministerial regulation No. 52 of 2017 the Minister of Energy and Mineral Resources will provide additional split regardless of the split until the field is feasible to be managed. For further research, it is recommended to conduct an economic review based on the application of taxes issued by the government in managing the field using a gross split contract.

Acknowledgement

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